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A new species of *Dipterocarpus (Dipterocarpaceae)* with vestigial fruit-calyx lobes

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Summary. *Dipterocarpus megacarpus* is described as a new species, presently found as localised populations in central Sabah's lowland dipterocarp forests. Its differences from two other species, *D. elongatus* and *D. tempehes*, which like it are characterised by fruits with vestigial fruit-calyx lobes, are discussed.

Although the Dipterocarpaceae has been revised (Ashton 1982) continuing fieldwork brings in further information and novelties. In Borneo, Ashton (1982) enumerated 267 species of Dipterocarpaceae, including 41 species of *Dipterocarpus*. In Sabah, until now, 179 species of Dipterocarpaceae including 28 species of *Dipterocarpus* have been recorded. During recent fieldwork in the Pinangah Forest Reserve near Sungai Imbak, in the Tongod District, Sabah, Malaysia, a new species of *Dipterocarpus* with vestigial calyx lobes in the fruit was collected. This paper describes the new species and explains its differences from the two other species of *Dipterocarpus* known also to have vestigial calyx lobes in fruit.

The new species

Dipterocarpus megacarpus *Madani*, sp. nov. species *D. elongati Korth. affinis sed fructibus subglobosis versus apicem tuberculis conspicuis destitutis, lobis calycum extus sparse pubescentibus vel glabris; stipulis pilis in caespitibus dispersis ferentibus, petiolis glabris differt. Typus: Wong WKM 2342, Sabah, Pinangah Forest Reserve, near Sungai Imbak (holotypus SAN; isotypi A, K, KEP, L, SAR).*

Tree, to 45 m tall, 80 cm diameter, with small buttresses. Bark smooth, lenticellate, pale brown, becoming scaly lenticellate; inner bark pale brown; wood pale yellow. Ultimate branches densely covered with long (4-6 mm) appressed hairs. Stipules encircling the twig, large, to 3-5 cm across and 5-8 cm long with only scattered tufts of coarse hair on

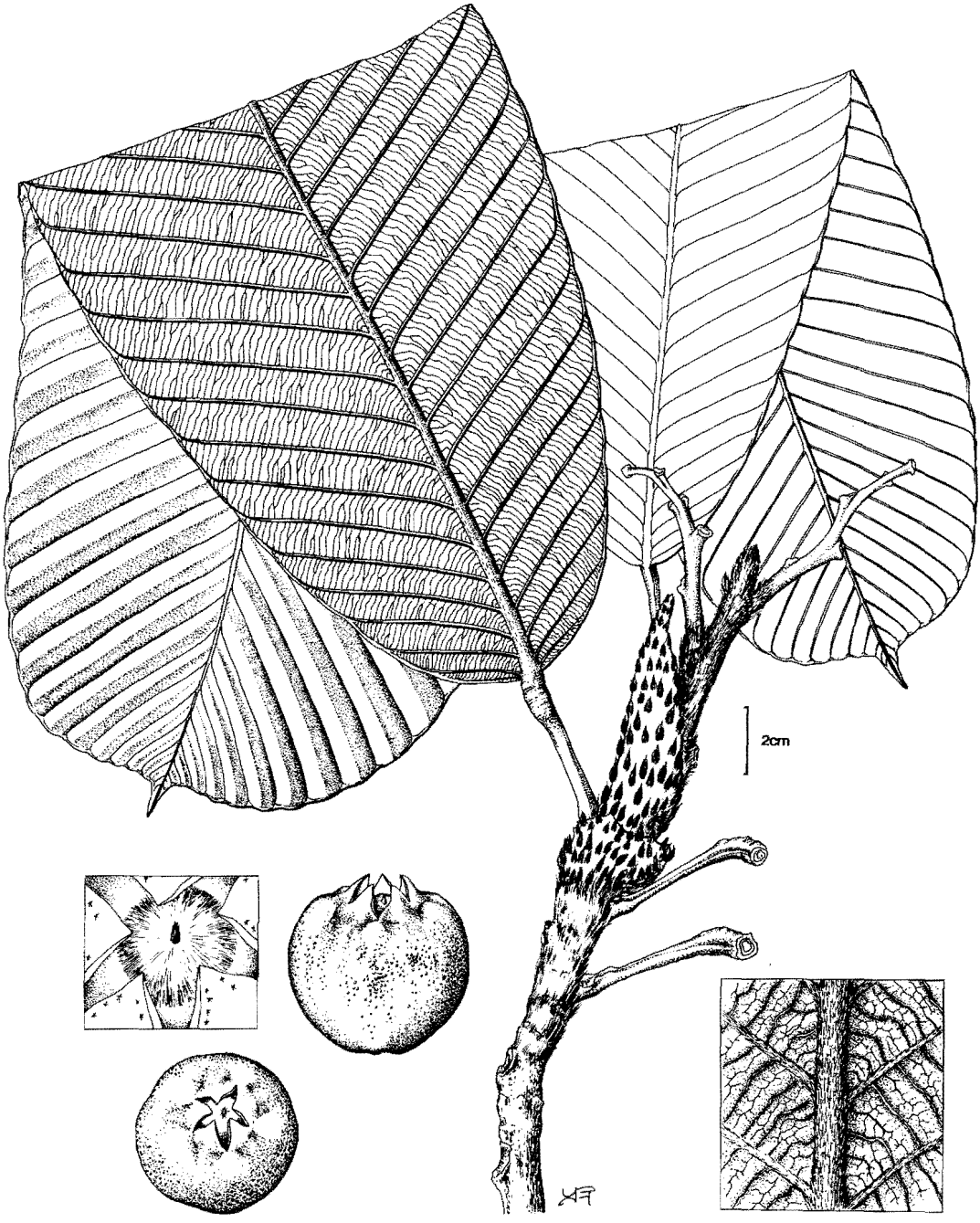

Fig. 1. *Dipterocarpus megacarpus*: leafy branch (right) and fruits (left; inset showing hairy fruit apex). From WKM 2342.

the surface, even when young. Leaves elliptic-obovate, apex abruptly caudate, base obtuse, margin wavy, stiffly coriaceous, to 55 cm long and 20 cm wide; midrib raised below, densely covered with pale long appressed hairs; secondary veins 25-40 pairs; tertiary veins ladderlike (scalariform) between secondary veins; leaf stalk to 3-5 cm long, 6-8 mm across, at first (in newly emerged leaves) with scattered tufts of hair but rapidly becoming glabrous in mature leaves. Flowers not seen but remains of corolla on some fruit observed to have obovate lobes about 3 cm long, 1 cm wide, and pale velvety hairy on the outside. Infructescence terminal, each bearing 4 to 10 fruits. Fruits subglobose, 3-6 cm across when mature, densely coarsely lenticellate all over, glabrous, apex with 5 faintly or weakly developed shoulders, even in young fruits; calyx lobes ovate-triangular, subequal (none expanded), 8-10 mm wide and 8-15 mm long; scantily-stellate hairy to glabrous on the outside.

The species is illustrated in Figs. 1, 2 and 3.

Fig. 2. Fruiting branch of *Dipterocarpus megacarpus*. Specimen WKM 2342 (photo: Robert C. Ong).

Fig. 3. Fruits of *Dipterocarpus megacarpus*. Note the remains of corolla still attached to the fruit near the centre (Photo: Robert C. Ong).

SPECIMENS EXAMINED - BORNEO. SABAH: Tongod District, Pinangah Forest Reserve, near Sungai Imbak, *Wong, Madani & Tokilip* WKM 2342 (holotype SAN, isotypes A, K, KEP, L, SAR); *L. Madani* SAN 133997 (SAN, A, K, KEP).

Discussion

In Malesia, only two other species of *Dipterocarpus* are known to have fruits with vestigial calyx lobes, *viz.*, *D. elongatus* Korth. and *D. tempehes* Sloot. (Ashton 1982). *D. elongatus* (Fig. 4) differs from *D. megacarpus* (Table 1) in having fruits with five strong tubercles below the calyx lobes at the apex of the fruit, calyx lobes which are densely stellate-hairy outside, and stipules and mature leaves with stalks which are completely covered by tufts of coarse hair. *D. tempehes* differs from *D. megacarpus* (Table 1) in having smooth fruits entirely without any shoulders or tubercles; calyx lobes which are glabrous on the outside, stipules which are completely covered by tufts of long hairs, and leaf stalks which are

densely covered by appressed long hairs. In contrast, *D. megacarpus* has fruits with five weakly developed shoulders below the calyx lobes near the apex of the fruit, calyx lobes that are scantily stellate-hairy to glabrous outside, stipules which bear only scattered tufts of hair, and glabrous leaf stalks in the mature leaf. The leaves of *D. tempehes* are also smaller, to 12 X 8 cm, whereas those of *D. elongatus* and *D. megacarpus* reach 50 X 20 cm.

Table 1. Characters distinguishing *Dipterocarpus elongatus*, *D. tempehes* and *D. megacarpus*.

	D. elongatus	*D. tempehes*	*D. megacarpus*
Leaf size	Large, to 50 X 20 cm	Small, to 12 X 8 cm	Large, to 55 X 20 cm
Number of nerves	25-38 pairs	9-12 pairs	25-40 pairs
Stalk of mature leaf	Completely covered by hair	Completely covered by hair	Glabrous
Stipules	Completely covered by hairs	Completely covered by hairs	With only scattered tufts of hairs
Fruit shape	Subglobose, with 5 strong tubercles at apex	Obovoid-subglobose, smooth	Subglobose, with 5 weakly developed shoulders at apex
Fruit size	To 5.5 cm across	2-4 cm across	3-6 cm across
Fruit-calyx	Densely stellate-hairy on outside	Glabrous outside	Scantily stellate-hairy to glabrous outside

Dr Peter Ashton (*in litt.*, 20 October 1992) has cautioned against uncritically accepting character-states of the mature fruit, leaf stalk and stipules as valid in distinguishing the taxon here named *D. megacarpus* and *D. elongatus*. He pointed out that the fruit-apex tubercles in tuberculate *Dipterocarpus* species may become stretched out, and hence less prominent, as the fruit matures. We are confident that this is not the case in *D.*

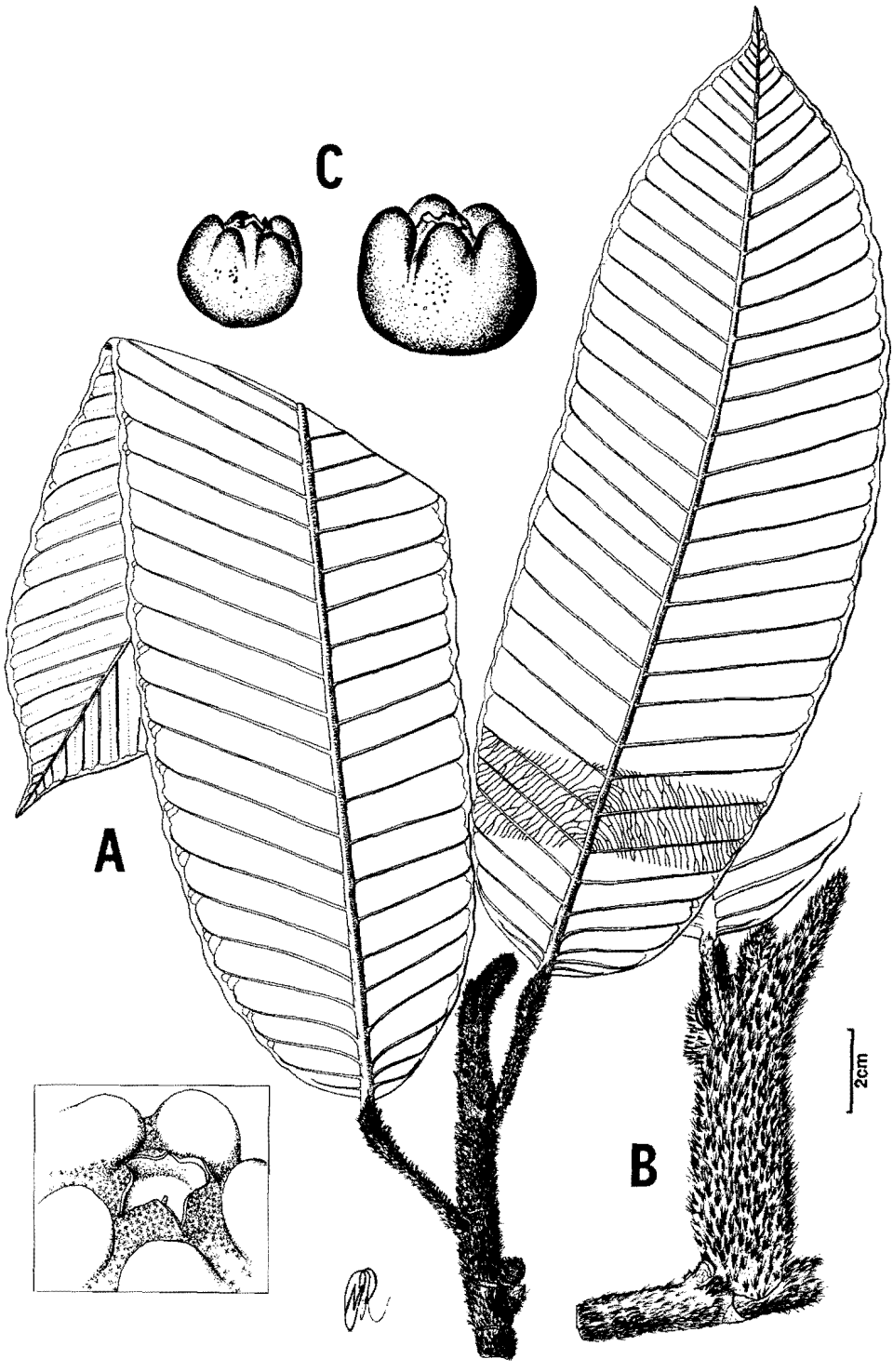

Fig. 4. *Dipterocarpus elongatus*. **A**, Leafy branch. **B**, Stipules. **C**, Young and mature fruit. Inset showing densely hairy fruit calyx. (A & C, *Ilias* S. 15131; B, *Sinclair* SFN 40296).

megacarpus after examining very many fruits, both young and mature, from different trees in the field as well as after drying. The fruit-apex tubercles in *D. megacarpus* are always weakly developed in young or old fruits; moreover young fruits do not shrink during drying such that the tubercles appear to be more prominent. Ashton also cautioned that apparent differences in tomentum on the leaf stalk and stipules can be deceptive, as during development and expansion of these organs individual hair tufts can be increasingly separated or even fall away. We are fortunate to have observed young plants raised at the Forest Research Centre, Sepilok, as well as in the field, and can offer comments on these characters. Newly emerged leaves of *D. megacarpus* bear scattered hair tufts on their stalks but these rapidly fall away, leaving glabrous stalks in all mature leaves. This is not the case in *D. elongatus* where mature leaf stalks retain their densely hairy nature, and very old stalks at least still show a hair cover. Thus Symington (1943) also figures a densely hairy leaf stalk in illustrating a typical mature leaf of *D. elongatus* (therein as *D. apterus*, a synonym). We have also compared young stipules of *D. megacarpus* and *D. elongatus*; those in *D. megacarpus* have comparatively sparse coarse hair tufts whereas those in *D. elongatus* are completely covered with fine hair tufts.

D. elongatus has been recorded from Malaya, eastern Sumatra, the Lingga Archipelago, Anambas Islands (S. China Sea), and Borneo (Sarawak and South East Kalimantan). *D. tempehes* is known only from Borneo (Sarawak and eastern Sabah south to Kutei in Kalimantan). As presently known, *D. megacarpus* is not at all common.

The population of *D. megacarpus* seen at the Pinangah Forest Reserve was apparently small. Only seven adult fruiting trees and about 8-10 saplings were seen although it is possible that more intensive searching in the area may yield further localised populations. Nevertheless *D. megacarpus* is a rare species.

Mature fallen fruit of *D. megacarpus* has been collected for the Arboretum of the Forest Department's Forest Research Centre at Sepilok, Sandakan, Sabah where a conservation collection of Sabah's woody plants is being assembled. It is planned to raise enough seedlings for eventual distribution to other gardens and institutions.

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